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Title of Invention: Optical Recording Medium

Claims

1. An optical recording medium having a characteristic of changing an optical constant of a recording layer before and after irradiation of light characterized in that,
the recording medium consists of Ag, Ga, Se and M, where M is at least one element selected from a group consisting of Co, Ni, Cu, Zn, Sn, Pb, Sb, In, Ge and Si.

2. The medium of claim 1, wherein the composition of the recording layer is expressed by the general formula:

$$Ag_{\alpha} \cdot Ga_{\beta} \cdot Se_{\gamma} \cdot M_{\delta}$$

where $18 \leqq \alpha \leqq 31$, $16 \leqq \beta \leqq 35$, $33 \leqq \gamma \leqq 65$, $1 \leqq \delta \leqq 13$ and

$\alpha + \beta + \gamma + \delta = 100$.

3. The medium of claim 1 or 2, wherein the characteristic of the recording layer is changeable in the following ranges before and after irradiation of light by adjusting the composition and thickness of the layer:

(i) the refractive index changes in a range of 2.1-5.47 in the amorphous state and changes in a range of 2.2-4.11 in the crystalline state, and

(ii) the amplitude damping coefficient changes in a range of 0.32-1.29 in the amorphous state and changes in a range of 0.14-1.59 in the crystalline state.

4. The medium of any one of claims 1-3, wherein the number of phases of the material constituting the recording layer are four or less.

5. The medium of any one of claims 1-4, wherein at least one heat-resistant and optical multi-interference layer selected from inorganic oxide and inorganic nitride is provided on the upper surface and under surface of the recording layer.

6. The medium of any one of claims 1-5, wherein a metal reflective heat dissipating layer of a Ag alloy is provided as a topmost layer.

The objective of the present invention is to provide an optical recording material of phase change type which enables an extremely large change in an optical constant to be attained before and after irradiation of a laser beam and to provide such a material having excellent recording and erasing sensitivities.

In Fig.1 showing an example of the recording medium of the present invention, heat-resistant protective layer 2, recording layer 3, heat-resistant protective layer 4 and reflective heat dissipating layer 5 are provided on substrate 1.

The material of substrate 1 can be glass, ceramics or resin. Resin is preferable in respect of formability and cost. Typical examples of resin are polycarbonate, acrylics, epoxy, polystyrene, acrylonitrile-styrene copolymer, polyethylene, polypropylene, silicon-based resin, fluorine-based resin, ABS resin and urethanes. Polycarbonate is preferable in respect of workability and optical characteristic. The form of the substrate can be a disk, a card or a sheet.

Heat-resistant protective layers 2 and 4 also act as multi-interference layers. Examples of the protective layer include inorganic oxide such as SiO, SiO_2, ZnO, SnO_2, Al_2O_3, TiO_2, In_2O_3 and ZrO_2, nitride such as Si_3N_4, AlN, TiN, BN and ZrN, sulfide such as ZnS, carbide such as SiC, TaC, WC, TiC and ZrC, diamond carbon and mixtures thereof. The protective layer is formed by vacuum deposition, sputtering, plasma CVD, ion plating, electron beam method, etc.

Additionally, the recording medium may include reflective heat dissipating layer 5. The layer has two functions: one of thermally controlling the incident laser beam and the other of allowing the laser beam to be absorbed effectively by recording layer 3. The layer 5 is preferably made of a Ag-based alloy having high heat conductivity, and a reflectance of 80% or more in the range from blue to red. Particularly preferred are Ag-Pd, Ag-Ni, Ag-Ti, Ag-Mn, Ag-Al, Ag-Au, etc. Among these, Ag-Pd alloys such as $Ag_{90}Pd_{10}$ are most preferred from an environmental characteristic viewpoint.